## CLAIMS

A 20 1. An exposure method which stitches and exposes a plurality of patterns on a substrate, thereby exposing a larger pattern than each of the patterns on the substrate, characterized by comprising:

stitching and exposing a plurality of patterns such that partial regions of the patterns are superposed on each other in a first direction and a second direction which intersect with each other, and

exposing, in a region where four patterns are adjacent to each other, the four patterns such that corner portions of the four patterns are superposed on each other with exposure amounts of the corner portions of the four patterns being respectively set based on a characteristic obtained by multiplying a first characteristic which gradually decreases outward along the first direction by a second characteristic which gradually decreases outward along the second direction when respectively exposing the four patterns.

2. An exposure method as recited in claim 1, characterized in that

when the corner portion of one of the four adjacent

patterns is exposed,

an exposure amount at the corner portion is set to have a value proportional to $(x/a)\cdot(y/b)$,

wherein widths in the first and second directions of the corner portion are respectively represented by "a" and "b" and coordinates increasing inward in the corner portion along the first and second directions are respectively represented by "x" and "y" with an apex of the corner portion being set to be a point of origin.

3. An exposure method which stitches and exposes a plurality of patterns on a substrate, thereby exposing a larger pattern than each of the patterns on the substrate, characterized by comprising:

stitching and exposing a plurality of patterns such that partial regions of the patterns are superposed on each other in a first direction and a second direction which intersect with each other, and

exposing, in a region in which four patterns are adjacent to each other, of a first pair of the patterns and a second pair of the patterns which are obliquely opposed to each other, the first pair of patterns with respective rectangular corner portions of the first pair of the patterns being superposed on each other and the second pair of

patterns with corner portions of respective triangles of the second pair of patterns being provided adjacently to each other in the rectangular corner portions.

4. An exposure method as recited in claim 3, characterized in that

when respectively exposing the second pair of patterns, exposure amounts of the corner portions of the triangles of the patterns are set based on a characteristic obtained by adding a first characteristic which gradually decreases outward along the first direction and a second characteristic which gradually decreases outward along the second direction, and

when respectively exposing the first pair of patterns, exposure amounts of the corner portions of the patterns are set based on a characteristic which gradually decreases outward one-dimensionally.

5. An exposure apparatus which transfers a pattern of a mask onto a substrate, characterized by comprising:

an illumination optical system which illuminates the mask;

a field stop which is disposed at a substantially conjugate position with respect to a pattern plane of the

mask in the illuminating optical system and which serves to set an illuminating region on the mask;

a substrate stage which positions the substrate; and

a beam attenuating filter which is provided on a plane in proximity to the pattern plane of the mask, a conjugate plane with respect to the pattern plane, or a plane in proximity to the conjugate plane and which serves to set a transmittance for illumination light for exposing a region corresponding to at least one corner portion of a pattern region having an external shape substantially parallel with a first direction and a second direction, which intersect each other, of the pattern plane based on a characteristic obtained by multiplying a first characteristic which gradually decreases outward along the first direction by a second characteristic which gradually decreases outward along the second direction.

6. An exposure apparatus which transfers a pattern of a mask onto a substrate, characterized by comprising:

an illumination optical system which illuminates the mask;

a field stop which is disposed at a substantially conjugate position with respect to a pattern plane of the mask in the illuminating optical system and which serves

to set an illuminating region on the mask;

a substrate stage which positions the substrate; and

a beam attenuating filter which is provided on a plane in proximity to the pattern plane of the mask, a conjugate plane with respect to the pattern plane, or a plane in proximity to the conjugate plane, wherein

the beam attenuating filter serves to set, of first and second pairs of corner portions, which are opposed obliquely to each other, of a pattern region having an eternal shape substantially parallel with a first direction and a second direction, which intersect each other, of the pattern plane, a transmittance for illumination light for exposure in a region corresponding to the first pair of corner portions based on a first characteristic which gradually decreases outward along the first direction or a second characteristic which gradually decreases outward along the second direction, and to set a transmittance for illumination light for exposure in a region corresponding to a second pair of corner portions, in a triangular region expanded outward along on opposed direction of the pair of corner portions, based on a characteristic obtained by adding the first characteristic which gradually decreases outward along the first direction and the second characteristic which gradually decreases outward along the

second direction.

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7. An exposure apparatus as recited in claim 5 or 6, characterized by comprising:

a positioning member which positions the beam attenuating filter in a plane perpendicular to an optical axis of illuminating light for exposure, and

a dustproof film disposed in a position set apart from a filter surface of the beam attenuating filter by a predetermined interval.

8. An exposure apparatus as recited in claim 7, characterized in that

the beam attenuating filter is disposed close to the field stop in the illuminating optical system such that the dustproof film is set between the beam attenuating filter and the field stop.

9. An exposure apparatus as recited in claim 8, characterized in that

the beam attenuating filter is disposed apart from a conjugate plane with respect to the pattern plane of the mask by a predetermined distance in the illuminating optical system.

10. An exposure apparatus as recited in claim 5 or 6, characterized by further comprising:

a mark detecting system which detects a mark on the mask and a mark on the beam attenuating filter, and

a driving mechanism which moves the beam attenuating filter based on a result of detection obtained by the mark detecting system.

11. An exposure apparatus as recited in claim 10, characterized in that

the driving mechanism moves the beam attenuating filter in a plane perpendicular to an optical axis of the illuminating optical system.

12. An exposure apparatus as recited in claim 10 or 11, characterized in that

the beam attenuating filter is disposed apart from the conjugate plane with respect to the pattern plane of the mask by a predetermined distance in the illuminating optical system.

13. An exposure apparatus as recited in claim 12, characterized in that

the driving mechanism can move the beam attenuating filter along an optical axis of the illuminating optical system in order to regulate the positional relationship with the conjugate plane and can be inclined with respect to a plane perpendicular to the optical axis.

14. An exposure method which respectively transfers a pattern onto at least two regions having peripheral portions partially superposed on each other on a substrate, characterized in that

in order to obtain at least one of position information and rotation information of a beam attenuating filter which gradually decreases, in a portion in which the at least two regions are superposed on each other, light amount on the substrate of illumination light illuminated on the pattern, at least one mark pattern provided on the beam attenuating filter is detected.

15. An exposure method as recited in claim 14, characterized in that

the relative relationship between the mask on which the pattern is formed and the beam attenuating filter is regulated based on the information obtained.

16. An exposure method as recited in claim 14, characterized in that

at least one of position and inclination of the beam attenuating filter with respect to an optical axis in an optical system in which the beam attenuating filter is disposed is regulated based on the information obtained.

17. An exposure apparatus which respectively transfers a pattern onto at least two regions having peripheral portions partially superposed on each other on a substrate, characterized by comprising:

a beam attenuating filter which gradually decreases light amount on the substrate of illumination light illuminated on the pattern in a portion in which the at least two regions are superposed on each other, and

a detecting device which detects at least one mark pattern provided on the beam attenuating filter in order to obtain at least one of position information and rotation information of the beam attenuating filter.

18. An exposure apparatus as recited in claim 17, characterized by further comprising:

an actuator which drives the beam attenuating filter in order to regulate at least one of position and rotation

of the beam attenuating filter.

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19. An exposure apparatus as recited in claim 17, characterized in that

the detecting device detects at least one of relative position information and relative rotation information between the beam attenuating filter and a mask on which the pattern is formed.

20. An exposure apparatus as recited in claim 17, characterized in that

the beam attenuating filter is disposed to be shifted from a pattern plane of a mask on which the pattern is formed or a conjugate plane thereof.

21. A mask, characterized in that

a device pattern is formed by screen-stitching of a plurality of mask patterns by the exposure apparatus as recited in any one of claims 5 to 13 and 17 to 20.

22. A method of manufacturing a device, characterized by comprising a step of transferring a device pattern onto a photosensitive substrate by using the exposing method as recited in any one of claims 1 to 4 and 14 to 16.

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23. A method of manufacturing a device, characterized by comprising a step of transferring a device pattern onto a photosensitive substrate by using the exposing method as recited in any one of claims 5 to 13 and 17 to 20.

24. A method of manufacturing a mask using the exposing method as recited in any one of claims 1 to 4 and 14 to 16, characterized by comprising a step of transferring a plurality of mask patterns onto a mask substrate while carrying out a screen-stitching by using the exposing method.

25. A method of manufacturing an exposure apparatus which transfers a mask pattern onto a substrate, characterized in that

an illumination optical system which illuminates the mask,

a field stop which is disposed at a substantially conjugate position with respect to a pattern plane of the mask in the illuminating optical system and serves to set an illuminating region on the mask,

a substrate stage which positions the substrate, and

a beam attenuating filter disposed on a plane in

proximity to the pattern plane of the mask, a conjugate plane with respect to the pattern plane or a plane in proximity to the conjugate plane, and serves to set a transmittance for illumination light for exposing a region corresponding to at least one corner portion of a pattern region having an external shape substantially parallel with a first direction and a second direction, which intersect each other, of the pattern plane based on a characteristic obtained by multiplying a first characteristic which gradually decreases outward along the first direction by a second characteristic which gradually decreases outward along the second direction,

are assembled with a predetermined positional relationship.

26. A method of manufacturing an exposure apparatus which transfers a mask pattern onto a substrate, characterized in that

an illumination optical system which illuminates the mask,

a field stop which is disposed at a substantially conjugate position with respect to a pattern plane of the mask in the illuminating optical system and serves to set an illuminating region on the mask,

a substrate stage which positions the substrate, and

a beam attenuating filter disposed on a plane in proximity to the pattern plane of the mask, a conjugate plane with respect to the pattern plane or a plane in proximity to the conjugate plane, and serves to set, of first and second pairs of corner portions, which are opposed obliquely to each other, of a pattern region having an external shape substantially parallel with a first direction and a second direction, which intersect each other, of the pattern plane, a transmittance for illumination light for exposure in a region corresponding to the first pair of corner portions based on a first characteristic which gradually decreases outward along the first direction or a second characteristic which gradually decreases outward along the second direction, and to set a transmittance for illumination light for exposure in a region corresponding to a second pair of corner portions, in a triangular region expanded outward along an opposite direction of the pair of corner portions, based on a characteristic obtained by adding the first characteristic which gradually decreases outward along the first direction and the second characteristic which gradually decreases outward along the second direction,

are assembled with a predetermined positional relationship.

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27. A method of manufacturing an exposure apparatus which respectively transfers a pattern onto at least two regions having peripheral portions partially superposed on each other on a substrate, characterized in that

a beam attenuating filter which gradually decreases, in a portion in which the at least two regions are superposed on each other, light amount on the substrate of illumination light illuminated on the pattern, and

a detecting device which detects at least one mark pattern provided on the beam attenuating filter in order to obtain at least one of position information and rotation information of the beam attenuating filter,

are assembled with a predetermined positional relationship.